MOTHS OF REDLAKE COTTAGE MEADOWS, CORNWALL 1986–1991

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INTRODUCTION

Redlake Cottage Meadows cover 12.5 hectares of mixed habitat near Lostwithiel in south-east Cornwall. It has been designated as a nature reserve by The Cornwall Trust for Nature Conservation because of the rare plants that occur there. The site presents an interesting mix of plants and trees. I conducted a moth survey as part of my work as voluntary warden of the reserve.

There are three main habitats in Redlake Reserve: wet meadow, wet heath and (wet) woodland (Figure 1). The main (northern) part of the site is wet heathland, dominated by *Molinia caerulea* (L.) with some *Calluna vulgaris* (L.), *Erica tetralix* L. and *Myrica gale* L. This area is being invaded by *Salix cinerea* L. and *Betula pubescens* Ehrh. There is a small reed-bed dominated by *Phragmites australis* (Cav.) in the north-western corner of the reserve. Across the middle (east–west) of the

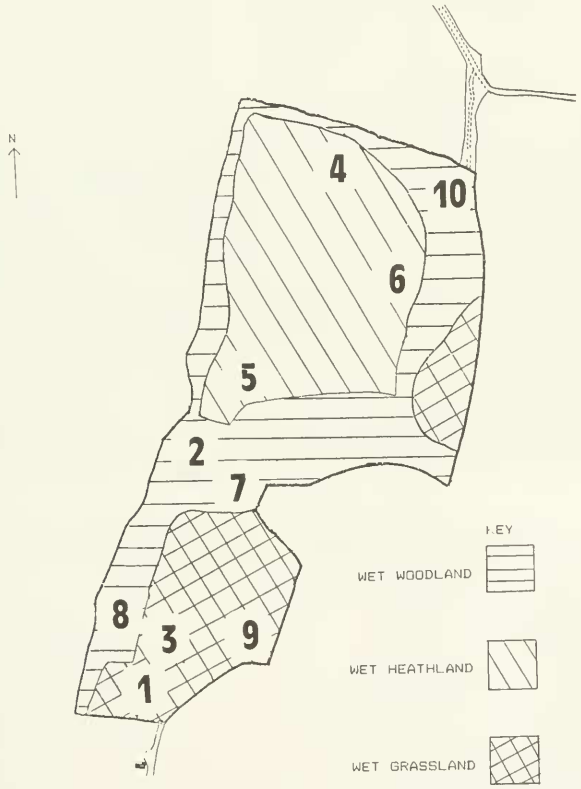

Fig. 1. Map of Redlake Cottage Meadows, with the numbered Heath trap sites 1–10.

reserve there is a band of woodland which continues along the western flank by the edge of the stream. Much of this woodland is *Salix* carr, but there are small amounts of *Alnus* carr and *Betula pubescens* scrub. *Quercus petraea* (Mattuschka), *Fraxinus excelsior* L. and *Crataegus monogyna* Jacq. are present. The southern most section of the reserve is neglected wet grassland, dominated by *Molinia caerulea* and *Juncus acutiflorus* Ehr., with drier areas covered by *Holcus lanatus* L. and *Dactylis glomerata* L. Invasive willow and birch is kept down by grazing and cutting. To the east, this wet meadow rises onto a dry grassy bank with *Ulex europaeus* L. and *Rubus* spp.

Aims

The aim of the survey was to record the moths of the reserve, to relate them as far as possible to each habitat type and to provide management recommendations for moth conservation. Most of the recording was done in 1991, using Heath traps placed in nine different sites (Figure 1). Twenty-four visits were made between 24 February and 1 October 1991. On several occasions two Heath traps were put out, making a total of 38 recording nights. The moths in each Heath trap were counted. A few records made during previous visits in 1986, 1988 and 1989 are included in this report. Some diurnal species were also recorded.

Results

166 species were recorded in 1991. The most productive sites for moths per night were sites 7, 8, and 9, but the most productive in total were sites 4, 5, and 6, all on wet heathland (Table 1). The addition of previous records for 1986, 1988 and 1989 brings the total to 213 (Appendix 1). Site 10 was only sampled during 1989.

The commonest moth was probably *Glyphipterix thrasonella*, a day-flying moth that was present in huge numbers in the wet grassland areas. The commonest moth at the light traps was *Agrotis exclamationis*, with 556 caught over 15 nights. Of these 259 were caught in one night on wet grassland (site 8) and 113 were caught at the edge of the reserve near sheep pasture (site 9). The next commonest species were *Diarsia mendica* (86), *Lycophotia porphyrea* (79), and *Orthosia gothica* (60). Most of these common moths were generally distributed throughout the reserve, except *Lycophotia porphyrea* of which all but one were found at the wet heathland sites 4 and 6. I also saw several male *Hepialus humuli* 'leking' at dusk on the dry grassy slope near site 9 before settling on grass flower heads to mate with the larger females.

Four nationally notable species (taken from Ball, 1986) were found in 1991 and one in 1988 (Table 2). Only singles were found of each species except *Lacanobia*

Table 1. Moth numbers for each site in 1991.

Site	Type	No. of species	No. of nights	Average per night
1	Wet grassland	33	6	5.5
2	Willow/alder carr	5	1	5.0
3	Wet grassland	33	4	8.3
4	Wet heath	68	8	8.5
5	Wet heath	67	6	11.2
6	Wet heath	73	8	9.1
7	Birch scrub	15	1	15.0
8	Wet grassland	48	3	16.0
9	Dry grassland	24	1	24.0
10	Birch/oak scrub	7	3	2.3

Table 2. Nationally notable species at Redlake Reserve in 1991.

Name	Status	Probable foodplants	Site	Nos
Callimorpha dominula	Nb	*Urtica*, *Rubus* spp.	near 7	1
Lacanobia contigua	Nb	Polyphagous	4, 6	3
Lithophane hepatica	Nb	Polyphagous	3	1
Paradarisa extersaria	Nb	*Betula*, *Quercus*	3	1
Schrankia taenialis	Nb	Unknown	5	1

Nb = species recorded in between 31 and 100 10-km squares in Britain.

contigua. *Callimorpha dominula* was seen flying by day over the wet grassland area. Two migrant species (*Spodoptera exigua* and *Autographa gamma*) were recorded.

The probable foodplants of each species (Table 3) have been calculated from a number of sources, including Emmet & Heath (1991), Gregory (1989) and Skinner (1984), as well as from my own personal experience. I have also examined the list of plants recorded on the reserve. For example, a large number of species which generally feed on willow and poplars choose willow in Cornwall since poplars are uncommon here. The larvae of some species were observed feeding on plants, e.g. *Pavonia pavonia* feeding on *Calluna vulgaris*, large numbers of *Coleophora alticolella* cases on *Juncus* species and several *Philudoria potatoria* feeding on *Molinia caerulea*. *Thera obeliscata* was the only conifer-feeding species found.

Discussion

Habitat differences

There was a noticeable difference between the catches of the wet heathland sites and the other areas. Only common species were present at sites 1, 2, 7 and 9, where most of the species were polyphagous. 174 moths were caught at site 9, of which 113 (65%) were *Agrotis exclamationis*. Site 3 was at the edge of *Quercus/Betula* scrub and wet grassland and 58% (19) of the species were polyphagous. The diurnal *Phytometra viridaria* was recorded here on the wet pasture, where its larvae feed on *Polygala serpyllifolia*. *Mesapamea didyma* was found here in 1988 (confirmed by dissection). Of the 48 species at site 8 29 (60%) were polyphagous feeders, and all the species are generally common.

Sites 4 and 6 were on the edge of wet heathland next to dry woodland with *Quercus*, *Salix* and *Betula pubescens*. There were several species common to both sites, e.g. moths of damp habitats such as *Photedes pygmina*, *Schrankia costaestrigalis* and *Xestia baja*, which is an uncommon heathland species in south-east Cornwall and

Table 3. Probable foodplants of species at Redlake Reserve.

Foodplant	No./species	Foodplant	No./species
Conifers	1	Lichen spp.	4
Galeopsis tetrahit L.	1	*Betula/Alnus*	5
Lotus uliginosus Schkuhr	1	*Betula*	5
Polygala serpyllifolia Hose	1	*Galium* spp.	6
Potamogeton polygonifolius Pourret	1	*Quercus*	6
Phragmites australis (Cav.)	1	*Salix*	15
Vaccinium myrtillus L.	1	Gramineae	24
Calluna/Erica	2	Sundry plants	31
Juncus spp.	3	Polyphagous	103
Lonicera periclymenum L.	3	Total	213

probably feeds here on the abundant *Myrica gale*. Most of the heather-feeding *Lycophotia porphyrea* were found here. Site 6 was the only site for *Mythimna straminea* (which feeds in the reed-bed at the edge of this area) and *Eulithis populata* (which feeds on *Vaccinium myrtillus* in open areas). *Mythimna pudorina* was common at both sites, where it probably feeds on *Molinia caerulea*.

Site 5 was on the edge of wet heathland dominated by *Molinia caerulea* and invaded by *Betula pubescens* and *Salix cinerea*. Most moth species were polyphagous, but there were 10 *Salix*-feeding species including the lovely *Xanthia togata*. The heathland species *Cybosia mesomella* was common to sites 5 and 6. Common to all three heathland sites were *Philudoria potatoria* and *Protodeltote pygarga*, both of which feed on *Molinia caerulea*.

The following species are generally wetland species, as indicated by their foodplants: *Bactra lancealana* (*Juncus* spp.), *Ebulea crocealis* (*Pulicaria dysenterica* (L.)), *Mythimna straminea* (*Phragmites australis*) and *Zygaena trifolii decreta* (*Lotus uliginosus*). None of these species is rare in Cornwall.

Rare species

I have calculated that there are 69 notable species which occur regularly in Cornwall, of which 52 occur regularly or occasionally in south-east Cornwall. Only 7% of the notable species found in Cornwall have been recorded from this reserve. *Lithophane hepatica* is widespread in Cornwall, although never abundant. *Callimorpha dominula* is common in wet places in Cornwall. Both *Paradarisa extersaria* and *Schrankia taenialis* are uncommon in Cornwall but regularly found in suitable places (Smith, 1984). Only *Lacanobia contigua* is rare, recorded from only three sites in Cornwall. Although polyphagous, this species appears to have specific habitat requirements and has been found in Cornwall only on heathland sites. The Redlake records are the first for south-east Cornwall.

The following species are uncommon in south-east Cornwall although not nationally rare: *Epiblema scutulana*, *Orthonama vittata*, *Eupithecia tripunctaria*, *Pterapherapteryx sexalata*, *Drymonia dodonaea* and *Xestia baja*. *Epirrita autumnata* and *Conistra ligula* appear to be uncommon in south-east Cornwall, but identifications are so often unconfirmed.

Management

The low numbers of rare species may be partly explained by the history of the site. In the past, when it was still privately owned, much of the reserve was divided into small meadows surrounded by hedges. These meadows were neglected and became scrubbed over. Some of the plant communities were saved just in time by the Cornwall Trust for Nature Conservation, which began a clearance programme. The encroaching *Salix* and *Betula* scrub has been cut back. This conservation programme has, as a by-product, aided moths such as *Perizoma alchemillata* (which feeds on *Galeopsis tetrahit*), *Eupithecia tripunctaria* (which feeds on *Sambucus nigra* L. and *Angelica sylvestris* L.) and *Callimorpha dominula* (which feeds on *Urtica dioica* L. and *Rubus* spp.). It is however necessary to be cautious about larval foodplants on the reserve unless larvae are actually seen feeding (Dobson, 1989). It is important to keep these wet grasslands clear of scrub so that these and other wetland species remain in the reserve. A large area of *Salix* and *Betula* scrub remains. Part of the conservation programme included the digging of a dragonfly pond, which provided as a by-product habitat for *Elophila nymphaeata* (found site 5) feeding on *Potamogeton polygonifolius*.

Heathland is rare in south-east Cornwall, although common elsewhere. The small areas of wet heathland in the reserve are probably remnants of larger heathland tracts

that have long since gone under the plough. These areas are the most important for moths. The wet heathland is under threat first by domination by *Molinia caerulea* and then by scrubbing-over with trees and *Ulex europaeus*. Grazing by cattle and clearance by hand are necessary to keep plant diversity high so that a wide variety of larval foodplants are retained. In this way, heathland species such as *Lycophotia porphyrea*, *Lacanobia contigua* and *Cybosia mesomella* will continue to live here.

References

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Appendix 1

Moth list for Redlake 1986, 1988, 1989, 1991.

Name	Sites	Numbers
Hepialus humuli L.	near 6	many
Nematopogon metaxella Hübn.	3	1
Zygaena trifolii decreta Ver.	3	many
Glyphipterix thrasonella Scop.	3	many
Argyresthia brockeella Hübn.	5	1
Argyresthia pygmaeella D. & S.	6	1
Argyresthia conjugella Zell.	3	1
Pseudoswammerdamia combinella Hübn	6	1
Ypsolopha parenthesella L.	4	1
Coleophora alticolella Zell.	near 3	many
Diurnea fagella D. &. S.	1	1
Agapeta hamana L.	8	1
Agapeta zoegana L.	6	1
Aethes cnicana Westw.	3	1
Eupoecilia angustana Hübn.	3	1
Pandemis cerasana Hübn.	3,4	2
Pandemis heparana D. & S.	6	1
Archips podana Scop.	9	1
Cnephasia stephensiana Doubl.	1,5,8	3
Acleris laterana F.	3	1
Acleris emargana F.	5	1
Olethreutes lacunana D. & S.	4	1
Hedya pruniana Hübn.	3	1
Apotomis turbidana Hübn.	3	1
Bactra lancealana Hübn.	5	2
Epinotia immundana F. R.	8	1
Epiblema uddmanniana L.	9	2
Epiblema scutulana D. & S.	5	1
Eucosma cana Haw.	3	1
Chrysoteuchia culmella L.	4,6	2
Agriphila tristella D. & S.	1	2

Appendix 1 (*cont.*)

Name	Sites	Numbers
Scoparia subfusca Haw.	1	16
Scoparia ambigualis Treits.	3	2
Eudonia mercurella L.	5,9	5
Elophila nymphaeata L.	5	1
Eurrhypara hortulata L.	8	1
Ebulea crocealis Hübn.	3	many
Udea olivalis D. & S.	3	7
Pleuroptya ruralis Scop.	5	1
Malacosoma neustria L.	5,6	2
Macrothylacia rubi L.	6,7	2
Philudoria potatoria L.	4,5,6,8	7
Pavonia pavonia L.	5	1
Falcaria lacertinaria L.	4,5,7,8	6
Drepana falcataria L.	5	1
Thyatira batis L.	3	1
Habrosyne pyritoides Hufn.	4	1
Ochropacha duplaris L.	3	1
Hemithea aestivaria Hübn.	6	1
Timandra griseata Peters.	3,8	2
Scopula floslactata Haw.	3,4,5,6	4
Idaea biselata Hufn.	1,5	4
Idaea dimidiata Hufn.	1,6	6
Idaea aversata L.	5,6,8,9	23
Orthonama vittata Borkh.	3	1
Xanthorhoe designata Hufn.	8	1
Xanthorhoe spadicearia D. & S.	8	2
Xanthorhoe montanata D. & S.	4	1
Xanthorhoe fluctuata L.	7	1
Scotopteryx mucronata Scop.	3	1
Epirrhoe alternata Mull.	5,6	3
Anticlea badiata D. & S.	4,6	2
Lampropteryx suffumata D. & S.	6,8	2
Cosmorhoe ocellata L.	4,5,8	3
Eulithis testata L.	4,5	6
Eulithis populata L.	6	1
Eulithis pyraliata D. & S.	4,9	2
Ecliptopera silaceata D. & S.	1,5,7	6
Chloroclysta truncata Hufn.	4,5,6,8	10
Thera obeliscata Hübn.	4	2
Colostygia pectinataria Knoch	3,4,5,6,7,8	18
Hydriomena furcata Thunb.	1,4,5,6,9	32
Epirrita dilutata D. & S.	10	1
Epirrita autumnata Borkh.	10	1
Perizoma alchemillata L.	3	4
Eupithecia pulchellata Steph.	3	1
Eupithecia tripunctaria H.-S.	3	1
Eupithecia subfuscata Haw.	3,6,8	5
Eupithecia abbreviata Steph.	1,4,7	3
Chloroclystis v-ata Haw.	1,8	3
Gymnoscelis rufifasciata Haw.	4,6	5
Euchoeca nebulata Scop.	3	2
Trichopteryx carpinata Borkh.	1,3,10	7
Pterapherapteryx sexalata Retz.	3	1

Appendix 1 (*cont.*)

Name	Sites	Numbers
Abraxas grossulariata L.	5	1
Lomaspilis marginata L.	3,4,8,9	6
Ligdia adustata D. & S.	8	1
Semiothisa alternaria Hübn.	4,5,6,8	10
Petrophora chlorosata Scop.	4,7	3
Plagodis pulveraria L.	5,8	2
Plagodis dolabraria L.	3	1
Opisthograptis luteolata L.	4,6,7,9	4
Epione repandaria Hufn.	5	1
Apeira syringaria L.	6	1
Ennomos quercinaria Hufn.	3	1
Ennomos alniaria L.	3	6
Ennomos fuscantaria Haw.	3	1
Selenia dentaria F.	1,4,5	5
Selenia tetralunaria Hufn.	2,5	2
Crocallis elinguaria L.	4	1
Colotois pennaria L.	3	9
Lycia hirtaria Cl.	2,3,4,7	7
Biston strataria Hufn.	1	1
Biston betularia L.	4,5,6	18
Agriopis marginaria F.	3	9
Erannis defoliaria Cl.	3	9
Peribatodes rhomboidaria D. & S.	8	2
Alcis repandata L.	3,4,5,6,8,9	29
Cleorodes lichenaria Hufn.	3	2
Ectropis bistortata Goeze	5	1
Ectropis crepuscularia D. & S.	4,6	2
Paradarisa extersaria Hübn.	3	1
Cabera pusaria L.	4,6	3
Cabera exanthemata Scop.	3,4,5,6,9	7
Lomographa bimaculata F.	3	2
Lomographa temerata D. & S.	5,6	2
Campaea margaritata L.	3	1
Sphinx ligustri L.	4	1
Smerinthus ocellata L.	3,4,5,6	7
Laothoe populi L.	1,5,6,7,8	9
Deilephila elpenor L.	6	2
Phalera bucephala L.	4,6,8	14
Cerura vinula L.	4	1
Stauropus fagi L.	6,8	2
Eligmodonta ziczac L.	4,5,6	4
Peridea anceps Goeze	6	2
Pheosia gnoma F.	4,5,6	6
Pheosia tremula Cl.	3	1
Ptilodon capucina L.	4,6,8	10
Pterostoma palpina Cl.	4	1
Drymonia dodonaea D. & S.	5	1
Drymonia ruficornis Hufn.	2	1
Dasychira pudibunda L.	4,5,6	4
Lymantria monacha L.	3	4
Cybosia mesomella L.	5,6	2
Eilema deplana Esp.	6	1
Eilema lurideola Zinck.	5	1

Appendix 1 (*cont.*)

Name	Sites	Numbers
Spilosoma lubricipeda L.	3,4,5,6,8,9	12
Spilosoma luteum Hufn.	3,5,6,8,9	15
Diaphora mendica Cl.	3,4,5,6,7,8	10
Callimorpha dominula L.	3	1
Agrotis exclamationis L.	1,3,4,5,6,8,9	556
Axylia putris L.	4,6,8	6
Agrotis puta Hübn.	1	1
Ochropleura plecta L.	1,4,5,6,8	32
Noctua pronuba L.	1,3,4,5,6,8,9	39
Noctua comes Hübn.	1,5,	4
Noctua janthina D. & S.	1,5	5
Paradiarsia glareosa Esp.	3	1
Lycophotia porphyrea D. & S.	4,6,9	79
Diarsia mendica F.	3,4,6,8,9	86
Diarsia brunnea D. & S.	3	1
Diarsia rubi View.	1,3,4,6,8	9
Xestia triangulum Hufn.	8,9	9
Xestia baja D. & S.	4,5,6	5
Xestia xanthographa D. & S.	3	3
Anaplectoides prasina D. &. S.	3	5
Cerastis rubricosa D. & S.	1,2,6,10	8
Discestra trifolii Hufn.	9	1
Polia nebulosa Hufn.	8	1
Lacanobia contigua D. & S.	4,6	3
Lacanobia thalassina Hufn.	3,4,6,8	6
Ceramica pisi L.	4	1
Hadena bicruris Hufn.	5	1
Tholera decimalis Poda	3	1
Orthosia gracilis D. & S.	4	1
Orthosia cerasi F.	1,3,4,5,8,10	23
Orthosia incerta Hufn.	1,3,4,5,6,7	10
Orthosia munda D. & S.	1	1
Orthosia gothica L.	1,3,4,5,6,7,8,10	60
Mythimna ferrago F.	4,6,9	5
Mythimna pudorina D. & S.	4,6,8	14
Mythimna straminea Treits.	6	5
Mythimna impura Hübn.	1,4,5,6	24
Mythimna comma L.	4	1
Lithophane hepatica Cl.	3	1
Xylocampa areola Esp.	1,2,6	3
Eumichtis lichenea Hübn.	4	1
Conistra vaccinii L.	1,5	5
Conistra ligula Esp.	10	1
Xanthia togata Esp.	4,5,6	4
Acronicta rumicis L.	4,7	4
Craniophora ligustri D. & S.	8	1
Amphipyra pyramidea L.	1	1
Rusina ferruginea Esp.	3,6,8,9	7
Euplexia lucipara L.	3	3
Cosmia trapezina L.	1,5	2
Apamea monoglypha Hufn.	1,4,5,6,8,9	30
Apamea crenata Hufn.	3	7
Apamea remissa Hübn.	3	2

Appendix 1 (*cont.*)

Name	Sites	Numbers
Oligis strigilis L.	6	1
Oligia latruncula D. & S.	4	1
Oligia fasciuncula Haw.	3	1
Mesapamea secalis L.	3	5
Mesapamea didyma Esp.	3	1
Photedes pygmina Haw.	4,5	4
Luperina testacea D. & S.	3	2
Gortyna flavago D. & S.	5	3
Charanyca trigrammica Hufn.	5,8	3
Hoplodrina alsines Brahm	4,6,8,9	41
Hoplodrina blanda D. & S.	3,6	4
Spodoptera exigua Hübn.	3	1
Protodeltote pygarga Hufn.	4,5,6,8	24
Pseudoips fagana F.	3	1
Colocasia coryli L.	1,5	3
Autographa gamma L.	3,6	many
Autographa pulchrina Haw.	3	1
Scoliopteryx libatrix L.	3,9	2
Phytometra viridaria Cl.	near 3	many
Rivula sericealis Scop.	near 3	many
Hypena proboscidalis L.	3	1
Schrankia taenialis Hübn.	5	1
Schrankia costaestrigalis Steph.	4,6	5

Total 213 species

Site 3 totals include 1986 and 1988 records.

BOOK NOTICES

Reproductive behaviour of insects: individuals and populations. Edited by W. J. Bailey and J. Ridsdill-Smith, London, Chapman and Hall, 340 pages, £45, hardback.—This book is the result of a symposium on insect behaviour at the annual meeting of the Australian Entomological Society, but its content, contributed by an international group of authors will make it of more than just antipodean interest. During their reproduction, insects exhibit a bewildering range of behavioural strategies, some are well documented, but others are still mystifying. The book covers the entire range of behaviour: mate finding and selection, host location and oviposition, competition for resources, feeding behaviour, covering all groups of insects.

The Aphidoidea (Hemiptera) of Fennoscandia and Denmark. IV, by O. E. Heie. *Fauna Entomologica Scandinavica* volume 25. Leiden, E. J. Brill, 1992, 190 pp, Gld 90, $51.43.—This is the fourth volume on the Aphidoidea, (the others by Heie being published in 1980, 1982 and 1986 respectively) and contains part of the tribe Macrosiphini (subfamily Aphidinae). The book continues the usual high quality of